IS 6316 (1993): Sowing Equipment - Seed-cum-fertilizer Drill - Test Code [FAD 21: Farm Implements and Machinery]

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IS 6316 : 1993
(Reaffirmed 1999)

भारतीय मानक

बोआई उपस्कर — खाद व ड्रिल — संहिता

(पहला पुनरीक्षण)

Indian Standard

SOWING EQUIPMENT — SEED-CUM-FERTILIZER DRILL — TEST CODE

(First Revision)

UDC 631·331·5 : 620·1

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

August 1993

Price Group 7

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Sowing, Fertilizer and Manure Application Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

Increase in the manufacture and use of seed-cum-fertilizer drills, has necessitated the application of standardized tests for evaluation of their performance on a uniform and rationalized basis.

This standard was first published in 1971. On the basis of the experience gained in testing of seed-cum-fertilizer drills, it has been revised.

In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

SOWING EQUIPMENT — SEED-CUM-FERTILIZER DRILL — TEST CODE

(First Revision)

1 SCOPE

This standard prescribes the method of testing for the performance of operation and soundness of construction of seed-cum-fertilizer drill.

2 REFERENCE

IS 6813 : 1993 'Specification for seed-cum-fertilizer drill (*first revision*)' is a necessary adjunct to this standard.

3 GENERAL

3.0 While carrying out the tests as recommended in **3.1** and **3.2,** it is desirable that soil scientists and agronomists may also be associated in the test, if possible. The test prescribed in **3.2** (f) is for determining the soundness of construction, whereas other tests are for ascertaining the performance of the drill.

3.1 Laboratory Test

The following tests shall be conducted in the laboratory:

a) *Metering Test*

1) *Calibration* — To determine the seed and fertilizer dropping rates obtainable at different settings and the variation among furrow openers when the machine is stationary, and

2) *Seed damage determination test* — To determine if any mechanical damage is done to the seed during the calibration.

b) *Uniformity of Seeding* — To determine whether the drill is placing the speed uniformly or not.

3.2 Field Tests

The drill shall be operated in the field to test the following:

a) *Field Operation* — To determine the range of seed and fertilizer dropping rates obtainable at different settings and the variation among openers while operating under field conditions and using the common kind of seed and fertilizer.

b) *Placement* — To check the accuracy of placing the seed and the fertilizer in respect of each other. The ability to place the seed at various depths. The performance of the covering devices and the amount of compaction of soil around the seed.

c) *Power Requirement* — To check the draft in kgf, speed in km/hour, metric horse power and metric horse power hours per hectare.

d) *Field Efficiency and Labour Requirement* — To check the field efficiency which is the ratio of effective field capacity to the theoretical field capacity expressed as percent and man-hours per hectare as lbour requirement.

e) *Ease of Operation and Adjustment*

f) *Suitability and Soundness of Construction*

4 SELECTION AND PREPARATION OF THE DRILL FOR TEST

4.1 Selection

The drill shall be selected at random from the production line as directed by the testing station complete with its usual accessories and in condition as generally offered for sale for commercial test report. The drill shall be new and should not be given any special treatment or preparation for test. The manufacturer may submit prototype for confidential test report. The nature of test report required by the manufacturer shall be stated.

4.1.1 The manufacturer shall supply operational manual, list of spare parts/parts catalogue and a specification sheet of the drill consisting of the items listed in the specimen report in Annex A, as well as any further data required to carry out the tests. These specification shall be verified by the testing station and reported in the *pro forma* as given in Annex A.

4.2 Preparation of the Drill for Tests, Running in and Preliminary Adjustment

4.2.1 The drill shall be new and run-in by the manufacturer before test, under his responsibility in accordance with his usual instructions to users and in collaboration with the testing station.

4.2.2 The test report shall state the place and duration of running-in.

4.2.3 The manufacturer may make adjustments during the period the drill is prepared for tests. These adjustments shall not be changed during the tests. In case it is found necessary to change the setting, alterations made shall be reported.

5 LABORATORY TESTS

5.1 Metering

5.1.1 *Calibration*

Series of tests at full, three-fourths, one half, and one-fourth capacity of the hopper shall be conducted. The step by step procedure shall be as follows:

a) Determine the nominal width of coverage of the drill. The nominal width is equal to the multiplication of the number of furrow openers and the spacing between the openers in cm.

Example:

4 furrow openers × 25 cm = 100 cm
= 1 m

b) Find the length of a strip, having the nominal width as determined in (a) above, necessary to make one hectare;

Example:

$$\frac{10\,000\ m^2}{1\ m} = 10\,000\ m$$

c) Determine the number of revolutions the ground wheel has to make to cover the length of the strip determined in (b) above. It is recommended that this should be done by actually operating the drill in the same field and soil conditions as will be used for the field operation test (**3.2**). Count the number of revolutions in a given distance, say, 100 metres. A 60-cm diameter wheel will probably make about 53 revolutions in 100 metres.

d) From the value found in (c) above, select a number of revolutions of the ground wheel to cover a convenient fraction of a hectare, say, 1/25. A driil having a nominal width of 1 m and ground wheel diameter of 60 cm will require about 212 revolutions to cover 1/25 hectare.

e) Calculate revolutions per minute of ground wheel in case of animal drawn drill and revolutions per minute of metering device in case of tractor-drawn drill. The travelling speed for animal-drawn drill should be 2·4 km/h and for tractor drawn drill the speed should be 3 and 5 km/h. A 60-cm diameter wheel makes about 21 revolutions per minute when travelling at a speed of 2·4 km/h.

f) Jack up the drill so that the ground wheels turn freely. Make a mark on the drive wheel and a corresponding mark at a convenient place on the body of the drill to help in counting the revolutions of the drive wheel.

g) Practise turning the wheel at the speed calculated in (e) above, if turning has to be done manually for animal-drawn drill.

h) Select the seed and fertilizer from the following for conducting the test;

Seed

1) Small size (mustard and bajra),
2) Medium size (wheat, sorghum and paddy), and
3) Large size (pea and gram);

Fertilizers

1) Calcium ammonium nitrate,
2) Ammonium sulphate,
3) Urea, and
4) Superphosphate.

The physical condition of the fertilizer shall be examined and reported.

j) Put selected seed and fertilizer in the hopper. Place a sack or container under each boot.

k) Set the rate control adjustment for the seed and the fertilizer for maximum drilling. Mark this position on the control for reference.

m) Engage the clutch or on-off adjustment for the hopper, and rotate drive wheel at the speed as calculated in (e) above. Turning of the wheel of animal-drawn drill may be done manually and for tractor-drawn drill metering device should be rotated at a constant speed by suitable power arrangement.

n) Weigh the quantity of seed and fertilizer dropped from each opener and record on the data sheet.

p) Calculate the seed and fertilizer dropped in kg/hectare and record on the data sheet.

q) Repeat the process indicated in (j) to (p) at least three times.

r) Set the rate control levers for the minimum and for specified rate setting and run as indicated in (j) to (p). Mark this position on the rate control for future reference.

5.1.1.1 Record the data according to Annex B.

5.1.2 *Mechanical Damage*

For each of the tests conducted in **4.1.1**, take one kg of seed from each sack and label with

test number, opener and rate setting. The seeds which would be used for metering shall be tested before and after the test to ensure its invisible (germination) damage and the samples of the seed obtained after passing through the metering shall be tested to ensure its visible damage. Count the number of seeds with visible damage. Take the mass of the damaged seeds in one kg of the sample and calculate the percentage of damaged seeds before and after the test.

5.1.2.1 Record the data according to Annex C.

5.2 Seeding Uniformity

Carry out the following test to ensure the uniformity in metering.

5.2.1 *Sticky Belt Method*

Mount the drill on a stand and allow a 10 m long (centre to centre) belt to travel under the furrow openers or seed tubes in such a way that the speed of the belt is equal to the running speed of the drill. Arrange the drive on the driving wheel of the drill. In case the drive is taken directly to the feed shaft of seed, keep the relationship between the speed of the feed shaft and belt the same as that of the feed shaft and ground wheel. Apply a sticky layer of grease to the belt to facilitate the proper embedding of seeds without any displacement. Keep the seed/fertilizer tube as close to the belt as possible. The belt used should be painted and marked in centimetres of quick reading. Operate the drill and observe the number of seeds dropped for each metre of belt length for recommended seed rate. Repeat the test at least three times.

5.2.2 *Sand Bed Method*

If the facilities for conducting tests as given in **4.2.1** do not exist, then this method be used. Prepare an artificial levelled bed of 25 cm depth from fine sand and of a length of at least 5 m and the width equal to the nominal width of the drill. Allow the drill to travel over this bed with furrow openers or seed tubes lowered as near to the top surface of the bed as possible. Observe the number of seeds dropped and the average distance between two seeds for each metre of bed length. Repeat the test at least three times. For repeating the test, get the sand sieved for separating the grain from sand.

5.2.3 Record the data according to Annex D.

6 FIELD TESTS

6.1 Field Operation

Operate the drill in a well prepared seedbed, that is, at least 15 cm deep, firm, fine structure, smooth and level; relatively free of surface trash and at good moisture content. The size of the trial plot shall not be less than 0·1 ha and 0·2 ha for the animal drawn and tractor operated drills respectively. As far as possible the shape of the plot should be a rectangular one with the sides in the ratio of 2 : 1. Follow the general procedure as for calibration (*see* **5.1.1**) except remove the ends of the seed and fertilizer tubes from the furrow openers and attach a bag to each end to collect the seeds and fertilizer whichever is the case. Also mark off in the field a distance, that when traversed, will represent a convenient part of a hectare. Use the same kind of seed and fertilizer as used in calibration test [*see* **5.1.1** (h)]. Repeat at least three times for maximum, minimum and recommended feed rate settings. Use the same identical adjustment settings as in calibration test (*see* **5.1.1**) as far as possible. Mark the positions on the rate control mechanism.

6.1.1 Record the data according to Annex E.

6.2 Placement

6.2.1 Operate the drill in the field under the same good seed bed conditions (*see* **6.1**), and with average depth setting of the furrow openers. Cover at least 100 m of row length. Carefully remove the soil without disturbing the seed and the fertilizer at several spots (a minimum of 5) in each row. Measure the depth of the seed below the soil surface and the vertical spacing of the fertilizer with respect to the seed. Do this by laying a plank across the row and measure downward from its lower edge to the seed and to the fertilizer. It will not be necessary to measure the horizontal spacing accurately as this is not as critical as the vertical spacing. It will be much easier to locate the seed and fertilizer if maximum rates of application are used. Also the fertilizer is more easily located if white lime is mixed with it.

6.2.2 Repeat the procedure as given in **6.2.1** at minimum and maximum depth settings of the furrow openers.

6.2.3 Record the data according to Annex F.

6.3 Power Requirement

6.3.1 *For Trailed Drill*

a) Insert a dynamometer in the hitch to measure the draft in kgf. The draft is defined as the horizontal component of the pull, parallel to the line of motion. If the line of pull through the dynamometer is not horizontal, then measure the angle, the line of pull makes with the horizontal and calculate the horizontal component (draft). A direct reading spring type dynamometer will be satisfactory.

b) Lay off a space of 50 m in the middle of a long row and mark each end of this space with an easily distinguished pole. If the field is small one may have to be satisfied with a shorter row. Divide this marked space in a minimum of 5 runs.

c) Operate the drill as in **6.2.1**. Start the drill well in advance of the first pole marker and be sure it is operating smoothly when it reaches this pole. As the drill travels the marked run length, record the dynamometer reading. The more the readings taken the better the results are. Calculate the average of all the readings taken within a particular run. A stop-watch or other accurate timepiece should be used to record the time for the machine to traverse the marked run length. From this value calculate the speed of travel in metre per second. Also calculate the wheel slip and theoretical field capacity.

d) Compute the power as follows:

$$\text{Metric horsepower} = \frac{\text{Draft in kgf} \times \text{Speed in metre per second}}{75}$$

e) Repeat the procedure indicated in (a) to (d) at least three times to arrive at average power requirement.

6.3.1.1 Record the data according to Annex G.

6.3.2 *For Mounted Drill*

a) Lay off a space of 25 m in the middle of a long row and mark each end of this space with an easily distinguished pole. Divide this marked space in a minimum of 5 runs.

b) Attach a direct reading spring type dynamometer in front of the tractor. Use another tractor to pull the tractor on which the drill is attached.

c) Operate the drill as in **6.2.1**. Start the drill well in advance of the first pole and be sure it is operating smoothly when it reaches this pole. As the drill travels the marked run length, record the dynamometer reading. The more the readings taken the better the results are. Calculate the average of all the readings taken within a particular run. A stop-watch or other accurate timepiece should be used to record the time for the drill to traverse the marked run. From this value calculate the speed of travel in metres per second. Also calculate the wheel slip and theoretical field capacity.

d) Detach the drill from the tractor and record the draft required only to pull the tractor (with which the seed drill was attached in the same manner as in (c) above. Take care that the tractor is pulled at the speed as in the case of (c).

e) Obtain the draft of the drill by deducting the draft of tractor [as obtained in (d)] from the draft of drill and tractor [as obtained in (c)].

f) Calculate the power in accordance with the procedure as given in **6.3.1**(d).

g) Repeat the procedure (a) to (f) a minimum of three times to arrive average power requirement.

6.3.2.1 Record the data according to Annex H.

6.4 Field Efficiency and the Labour Requirement

The theoretical field capacity in hectare per hour may be taken from the power requirement tests. It is the rate of field coverage that would be obtained if the drill was operating continuously without interruptions (turning at the ends, filling of hoppers, etc). The effective field capacity is the actual average rate of coverage. It includes the time lost in filling hoppers, turning at the end of the rows, unclogging of openers, making adustments, etc. The labour required for operating the drill is measured at the same time that the field capacity is determined. It is the number of the manhours used to cover one hectare of effective field area.

6.4.1 Record the data in accordance with Annex J.

6.5 Assessing the Ease of Operation and Adjustments

The observations regarding the ease of operation and adjustments shall be recorded in accordance with Annex K.

6.6 Suitability and Soundness of Construction

The drill shall be operated in continuous field work for at least 4 hours. It is preferred if at least 20 hours test is perfomed.

7 REPORTING RESULTS

7.1 For reducing the data to a usable form prepare a summary report in accordance with Annex L. The performance conformity in relation to the performance requirements specified in IS 6813 : 1993 shall also be mentioned in detail against item 5 of the summary report.

ANNEX A

(*Clause* 4.1.1)

SPECIFICATION SHEET

A-1 GENERAL

a) Name

b) Type

c) Make

d) Serial No.

e) Model

f) Year of manufacture

g) Different seeds which the drill is designed to sow

h) Source of power

j) Recommended travelling speed of the drill

k) Recommended power of tractor (if tractor operated)

m) Location of fertilizer outlet in relation to seed outer.

A-2 FURROW OPENERS

a) Type and tilt angle with respect to vertical

b) No. of openers

c) Arrangement of openers

d) Range of selection of openers

e) Method of changing row space and range

f) Nominal width

g) Lifting and lowering of openers

h) Depth control

j) Fertilizer pacement with respect to seeds

A-3 METERING MECHANISM

a) Seed metering device:

1) Type

2) Size of feed shaft

3) Size (dia) and number of fluted rollers (in case of plate type, the number of holes)

4) Source of power (ground wheel or other)

5) Transmission ratio of shaft of seed metering device to land wheel axle

6) Type of agitator

7) Method of feed rate control for different sizes of seeds

8) Provision for closing seed discharge

b) Fertilizer distributor:

1) Type

2) Size of shaft

3) Size and number of metering device

4) Type of agitator

5) Method of feed rate control

6) Provision for closing and opening of hopper gate

7) Transmission ratio of the feed shaft to land wheel axle

A-4 HOPPER

a) Capacity:

1) Seed box

2) Fertilizer box

b) Type of hoppers.

A-5 MARKER DETAILS

a) Type

b) Details of range of adjustment

A-6 SEED COVERING ARRANGEMENT

A-7 TYPE OF HITCH AND ITS DETAILS

A-8 GROUND DRIVE DETAILS

a) No. of wheels

b) Type of wheel

c) Size

d) Method of transmitting power to feed shafts

A-9 DETAILS OF ADJUSTMENTS

A-10 DETAILS OF SAFETY ARRANGEMENT FOR ROTATING PARTS

A-11 DIMENSIONAL DETAILS OF HANDLE, ITS HEIGHT FROM GROUND LEVEL AND ADJUSTMENT, IF ANY (IN CASE OF ANIMAL-DRAWN DRILLS)

A-12 OVERALL DIMENSIONS

a) Length

b) Width

c) Height

d) Weight with seeds and fertilizers

e) Ground clearance

A-13 NUMBER OF GREASING POINTS

A-14 DETAILS OF MATERIAL OF CONSTRUCTION

Sl No.	*Name of Part*	*Material*	*Section or Size in* mm
(1)	(2)	(3)	(4)
1.			
2.			
3.			
4.			
5.			

A-15 TYPE OF TEST REQUIRED **Commercial/Confidential**

ANNEX B

(*Clause* 5.1.1.1)

CALIBRATION DATA SHEET

B-1 DATE

B-2 NOMINAL WIDTH

B-3 LENGTH OF A STRIP TO COVER ONE HECTARE AREA

B-4 NUMBER OF REVOLUTIONS OF GROUND WHEEL TO COVER LENGTH OBTAINED IN (3)

B-5 NUMBER OF REVOLUTIONS OF GROUND WHEEL TO COVER .....HECTARE

B-6 REVOLUTIONS PER MINUTE OF GROUND WHEEL AT A SPEED OF.....km PER HOUR

B-7 REVOLUTIONS PER MINUTE OF METERING DEVICE AT A SPEED OF.....km PER HOUR

a) For seed metering device

b) For fertilizer metering device

B-8 CAPACITY OF HOPPER

B-9 TEST FOR SEEDS

a) Kind of seed

b) Variety of seed

c) Seed distribution:

Rate Setting	Test No.	Weight of Seed in kg from Furrow Openers								Weight of Seed from all Furrow Openers in kg/ha
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	Average	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	1									
	2									
	3									
	Average									

NOTES

1 For different rate settings, the seed distribution shall be recorded on similar *pro forma*.

2 Date sheet shall be extended for additional number of furrow openers.

B-10 TEST OF FERTILIZERS

a) Kind of fertilizer

b) Physical condition of fertilizer

c) Fertilizer distribution:

Rate Setting	Test No.	Weight of Fertilizer in kg from Furrow Openers								Weight of Fertilizer from all Furrow in Openers in kg/ha
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	Average	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	1									
	2									
	3									
	Average									

NOTES

1 For different rate settings, the fertilizer distribution shall be recorded on similar *pro forma.*

2 Data sheet be extended for additional number of furrow openers.

Testing Engineer

ANNEX C

(*Clause* 5.1.2.1)

MECHANICAL DAMAGE DATA SHEET

C-1 DATE

C-2 KIND OF SEED

C-3 VARIETY OF SEEDS

C-4 DAMAGED SEED DISTRIBUTION IN OPENERS

Rate Setting	Test No.	Damage, Percent, in Seed Hopper (Before Calibration Test)	Damge, Percent in Opener (After Calibration Test)							
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	Average
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	1									
	2									
	3									
	Average									

NOTES

1 For different rate settings, the damaged seed distribution shall be recorded on similar *pro forma.*

2 Data sheet shall be extended for additional number of furrow openers.

Testing Engineer

ANNEX D

(*Clause* 5.2.3)

SEEDING UNIFORMITY DATA SHEET

D-1 DATE

D-2 KIND OF SEED

D-3 VARIETY OF SEED

D-4 LENGTH OF THE BELT/SAND BED

D-5 WIDTH OF BELT/SAND BED

D-6 SPEED OF THE BELT

D-7 SEED DISTRIBUTION DURING TEST :

Rate Setting	Parameter	Test No.	Belt/Bed Length in Metres										Average
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	No. of seeds fallen	1											
		2											
		3											
		Average											
	Average distance between two seeds	1											
		2											
		3											
		Average											

NOTE — For different rate settings, the seed dtstribution shall be recorded on similar *pro forma.*

Testing Engineer

ANNEX E

(*Clause* 6.1.1)

FIELD OPERATION DATA SHEET

E-1 DATE

E-2 DESCRIPTION OF SEED BED

a) Type of soil

b) Soil moisture content in percent (0 to 15 cm depth, average)

c) Bulk density (optional)

d) Presence of weeds and trash

e) Size of clods

f) Depth of seed bed

E-3 TEST CONDITIONS

E-3.1 Seed-cum-Fertilizer Drill

a) Type
b) Adjustment levels of various levers (for adjusting delivery rate of seed and fertilizer)
c) Travel pattern

E-3.2 Source of Power

E-3.2.1 *Animal*

E-3.2.2 *Power Tiller/Tractor*

E-4 TEST FOR SEEDS

a) Kind of seed
b) Variety of seed
c) Damaged seeds before test
d) Seed distribution in openers (optional):

Rate Setting	Test No.	Weight of Seed in kg from Furrow Openers								Weight of Seed from all Furrow Openers in kg/ha
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	Average	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	1									
	2									
	3									
	Average									

NOTES

1 For different rate settings, the seed distribution shall be recorded on similar *pro forma*.
2 Data sheet shall be extended for additional number of furrow openers.

E-5 TEST FOR FERTILIZERS

a) Kind of fertilizer
b) Physical condition of fertilizer
c) Fertilizer distribution:

Rate Setting	Test No.	Weight of Fertilizer in kg from Furrow Openers								Weight of Fertilizer from all Furrow Openers in kg/ha
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	Average	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	1									
	2									
	3									
	Average									

NOTES

1 For different rate settings, the fertilizer distribution shall be recorded on similar *pro forma*.

2 Data sheet shall be extended for additional number of furrow openers.

Testing Engineer

E-6 WHEEL SLIP

ANNEX F

(*Clause* 6.2.3)

PLACEMENT DATA SHEET

F-1 DATE

F-2 LENGTH OF ROW

F-3 MEASUREMENT OF SEED AND FERTILIZER PLACEMENT:

Depth Setting	Parameters	Row No. 1 Measuring Points					Row No. 2 Measuring Points					Average
		1	2	3	4	5	1	2	3	4	5	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Maximum	Depth of seed											
	Depth of fertilizer											
	Vertical spacing between seed and fertilizer											
	Approx horizontal spacing between seed and fertilizer											

NOTES

1 For minimum and average depth setting, the placement data shall be recorded on similar *pro forma*.

2 Data sheet shall be extended for additional number of rows.

Testing Engineer

ANNEX G

(*Clause* 6.3.1.1)

POWER FOR TRAILED DRILL DATA SHEET

G-1 DATE

G-2 POWER REQUIREMENT :

Test No.	Total Marked Space, m	Run No.	Length of Run, m	Time Spent to Cover the Run in Seconds	Speed in m/s	Revolution of Wheel to Cover the Run	Wheel Slip in Percent	Average Draft in kgf	Metric Horse Power	Theoretical Field Capacity ha/h
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1		1								
		2								
		3								
		4								
		5								
2		1								
		2								
		3								
		4								
		5								
3		1								
		2								
		3								
		4								
		5		Average						

Testing Engineer

ANNEX H

(*Clause* 6.3.2.1)

POWER FOR MOUNTED DRILL DATA SHEET

Test No.	Total Markcd Space, m	Run No.	Length of Run, m	Time Speed to Cover the Run in Seconds	Speed in m	Revolutions of Wheel to Cover the Run	Wheel Slip in Percent	Average Draft of Drill with Tractor in kgf	Average Draft of Tractor in kgf	Average Draft of Drill, kgf	Metric Horse Power	Theoretical Field Capacity ha/h
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1		1										
		2										
		3										
		4										
		5										
2		1										
		2										
		3										
		4										
		5										
3		1										
		2										
		3										
		4										
		5										
Average												

Testing Engineer

ANNEX J

(*Clause* 6.4.1)

FIELD EFFICIENCY AND LABOUR REQUIREMENT DATA SHEET

J-1 DATE

J-2 EFFECTIVE FIELD CAPACITY AND LABOUR REQUIREMENT:

Field No.	*Size*		*Time Spent*				*Time Spent for Turning at Head Land*	*Time Spent for Supply of Fertilizer and Seed*	*Time Spent for Adjustment of Machine*	*Time Spent for Rectifying Machine Trouble*	*Area Covered*			*Effective Field Capacity* ha/h	*No. of Labourers Used*	*Labour Requirement Man-hour per Hectare*	*Remarks*
	Width m	Length, m	Starting Time	Ending Time	Total Time Spent	Actual Operating Time					Width, m	Length, m	Area, in ha				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1																	
2																	
3																	

J-3 FUFL CONSUMPTION (IN CASE OF TRACTOR OPERATED)

J-4 AVERAGE THEORETICAL FIELD CAPACITY

J-5 FIELD CAPACITY

ANNEX K

(*Clause* 6.5)

ASSESSMENT OF EASE OF OPERATION AND ADJUSTMENT DATA SHEET

K-1 EASE OF OPERATION :

a) The machine trails behind the prime mover satisfactorily

b) It is easy to plant in straight and uniform rows

c) The seed or fertilizer openers clog: Yes/No

i) Frequency of clogging

ii) Time spent in clearing the clogging

d) Hopper agitators working properly

e) Fertilizer bridge over the openings

f) Seed and/or fertilizer covering is done properly Yes/No

g) Quantity of uncovered seed (collected at random)

K-2 ADJUSTMENTS :

a) Seed and fertilizer regulating mechanism:

i) Drive

ii) Agitation

iii) Adjustment for different seeds

iv) Adjustment for mixed cropping

v) Adjustment for fertilizer

b) Adjustment for width

c) Adjustment for depth

d) Arrangement to check the seed and fertilizer while the machine is in operation

e) Seed covering adjustment

Testing Engineer

ANNEX L

(*Clause* 7.1)

SUMMARY REPORT

L-1 NAME OF MANUFACTURER

L-2 MODEL NUMBER AND NAME OF DRILL

L-3 PERIOD COVERED DURING FIELD TESTS

L-4 NATURE OF TEST Commercial/Confidential

L-5 PERFORMANCE

L-6 BREAKDOWNS

L-7 WEAR ON COMPONENT

L-8 EASE OF REPLACEMENT OF PARTS

L-9 SUGGESTIONS FOR IMPROVEMENTS (IF ANY)

L-10 GENERAL REMARKS

Testing Engineer

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The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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Doc : No. FADC 36 (4086)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at New India Printing Press, Khurja, India